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~~"Rear derailleur for bicycle gear changes"~~

a BACKGROUND OF THE \*\*\*INVENTION

The present invention relates to a rear derailleur for bicycle gear changes.

Bicycle derailleurs comprise a top body which is designed to be fixed to the bicycle frame and which is referred to as "hanger bracket", and a bottom body, referred to as "pulley-cage bracket", which carries a rocker member that in turn carries two idler wheels that co-operate with the chain. The pulley-cage bracket is connected to the hanger bracket by means of an articulated-parallelogram mechanism comprising a first link and a second link. The said links are articulated to the hanger bracket and the pulley-cage bracket by means of pins which define the axes of articulation of the articulated-parallelogram mechanism.

In higher-quality derailleurs, the hanger bracket, pulley-cage bracket and the links of the articulated-parallelogram mechanism are made of light metal alloys, such as aluminium alloys or the like. Articulation of the links of the articulated-parallelogram mechanism to the hanger bracket and pulley-cage bracket is obtained by inserting axially the pins inside aligned holes of one of the brackets and one of the links. Each pin is constrained against sliding out in the direction of its own axis by means of plastic deformation of one or both of its ends against a surface of the hanger bracket or of the pulley-cage bracket, or else by means of a knurling of the pin which interferes with a corresponding wall of a hole made in one of the bodies. The deformation of the ends of the pins against the hanger bracket or the pulley-cage bracket, or else the drive fit of a knurled portion of the pin in a hole, does not create any problem in the case where the said bodies are made of metal material. It has, however,

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The purpose of the present invention is to overcome the aforesaid drawback by proposing a rear derailleur having the characteristics that form the subject of the main claim. *DESCRIPTION OF THE DRAWINGS*

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The hanger bracket 12 is designed to be fixed to a bicycle frame (not illustrated) by means of a fixing screw 18.

*Sub B2* → ~~The pulley cage bracket 14 carries, in a known way, a rocker member 20 which is mounted in such a way that it can oscillate about a pin 22 and which carries a pair of idler wheels designed to co-operate with the chain (not illustrated).~~

The articulated-parallelogram mechanism 16 comprises a front link 26 and a rear link 28. The links 26, 28 are articulated to the hanger bracket 12 and to the pulley-cage bracket 14 by means of respective pins 30, 32.

With reference to Figures 3 to 8, according to the present invention the pins 30, 32 are constrained against sliding out in the direction of their own axes without any deformation of their ends, this being particularly advantageous in the case where the said brackets are made of plastic material, in so far as the deformation of the ends of the pins could cause initiation of failure or cracking of the brackets. According to the invention, the axial constraint of each pin 30, 32 is obtained by means of a respective washer 34, preferably made of plastic material, shaped in such a way as to engage by snap action an annular groove 36 made in the pin 30, 32. The washer 34 has a continuous annular portion or rim 38 internally provided with snap-action engagement portions 40 which are elastically deformable. The portions 40 are formed by integral prolongations which project inwards from the inside of the annular rim 38 and are separated from one another by incisions 42 in order to increase deformability of the portions 40 in the axial direction. The deformable portions 40 define a through hole 44 which has a diameter smaller than the outer

diameter of the cylindrical surfaces of the pins 30, 32. In the case of the pins 30 which provide the articulation of the front link 26 to the hanger bracket 12 and to the pulley-cage bracket 14, the circumferential groove 36 is provided in a central portion of the pin. The washer 34 is housed in a groove or notch 46 made in the top or bottom end portion of the front link 16. In the case of the pins 32 which provide the articulation of the rear link 28 to the hanger bracket 12 and to the pulley-cage bracket 14, the annular groove 36 is made in the vicinity of one end of the pin, and the washer 34 is housed between two surfaces facing one another of the link 28 and of the bracket 12 or 14 (Figure 3).

Assembly of the derailleur 10 is carried out by positioning the washer 34 in such a way that its central hole 44 is aligned with the hole 48 of the hanger bracket 12 or pulley-cage bracket 14 and with the hole 50 of the front link 26 or rear link 28. The pin 30 or 32 is then inserted in the direction of its own axis into the aligned holes 48, 44 and 50. The pin must be driven in with a certain amount of force in order to produce elastic deformation of the deformable portions 40. To prevent any damage to the washer, each pin is provided with a lead-in chamfer 52 on one or both of its ends. The deformable portions 40 engage by snap action inside the annular groove 36 of the pin 30 or 32 as soon as the said groove arrives at the deformable portions 40. At this point, the assembly is completed in so far as the washer 34 is fixed integrally with the pin 30 in the axial direction and constitutes a radial shoulder that prevents any sliding-out of the pin 30 or 32 in the direction of the axis of the latter. The annular groove 36 of the pin 30 or 32 is shaped in such a way as to establish a shape

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